GY-271 QMC5883P 3-Axis Magnetometer Module

5-pad I2C breakout · QMC5883P 3-axis magnetic sensor · Onboard regulator, 3 V to 5 V supply · Fixed address 0x2C

3 V TO 5 V | ±2 TO ±30 G | 16-BIT | I2C 0x2C | CHIP ID 0x80 | HEADER INCLUDED

1 DEVICE IDENTIFICATION

ITEM	VALUE
Order code	**MOD-QMC5883P-GY271**
Contents	**1 x module, 1 x 5-pin 2.54 mm male header, not soldered**
Board markings	**GY-271 and SY-152 on the back; Z, Y, X axis arrows on the front**
Sensor chip	**QMC5883P, 3-axis magneto-resistive (AMR) sensor with 16-bit ADC**
Chip marking	**HP over 5883. The P identifies the QMC5883P**
Interface	**I2C only, fixed 7-bit address 0x2C**

Software written for the QMC5883L (0x0D) or HMC5883L (0x1E) does not work with this chip. Use a QMC5883P driver; see section 11.

2 PIN FUNCTIONS

PAD	NAME	FUNCTION
1	**VCC**	Supply, 3 V to 5 V. Feeds the onboard regulator that powers the sensor chip.
2	**GND**	Ground, common with the host.
3	**SCL**	I2C clock. Pull-up resistor fitted on the board.
4	**SDA**	I2C data. Pull-up resistor fitted on the board.
5	**DRDY**	Not connected on this board. Leave it unconnected and poll the status register instead.

Names as printed on the back. Pads are one row at 2.54 mm pitch, numbered here from VCC to DRDY (Figure 1).

DRDY does nothing on this board. The QMC5883P has no data-ready output, so nothing drives this pad. Leave DRDY unconnected and read the DRDY bit (bit 0) of status register 0x09, or call **isDataReady()** in the library.

3 SPECIFICATIONS

3.1 RECOMMENDED OPERATING CONDITIONS (BOARD)

PARAMETER	CONDITIONS	MIN	MAX	UNIT
Supply, VCC	VCC pad to GND	**3.0**	**5.0**	V
Host I2C logic level	Same voltage as VCC	**3.0**	**5.0**	V
I2C clock	Standard or fast mode		**400**	kHz
Operating temperature	Sensor chip rating	**-40**	**+85**	°C

An onboard regulator feeds the sensor chip, so the board works with 5 V Arduino boards and 3.3 V boards. Power VCC from the same voltage as the host's I/O: 5 V on a 5 V Arduino, 3.3 V on an ESP32 or Raspberry Pi.

3.2 SENSOR CHIP ABSOLUTE MAXIMUM RATINGS

PARAMETER	MIN	MAX	UNIT
Chip supply VDD (after the regulator)	**-0.3**	**5.4**	V
Storage temperature	**-40**	**+125**	°C
Magnetic field exposure, any direction		**50000**	G
ESD, human body model	**4000**		V
ESD, charged device model	**1000**		V

Stress limits of the sensor chip only, not ratings for the VCC pad. The chip's own operating supply is 2.5 V to 3.6 V, provided by the regulator. Operation at these limits is not implied.

3.3 SENSOR CHIP SUPPLY CURRENT

MODE	CONDITIONS	TYP	UNIT
Suspend	Default after power-up	**22**	µA
Normal, 10 Hz	OSR1 = 1 / OSR1 = 8	**35 / 78**	µA
Normal, 50 Hz	OSR1 = 1 / OSR1 = 8	**85 / 310**	µA
Normal, 100 Hz	OSR1 = 1 / OSR1 = 8	**150 / 600**	µA
Normal, 200 Hz	OSR1 = 1 / OSR1 = 8	**280 / 1180**	µA
Continuous	Maximum rate, 1500 Hz	**2200**	µA

Sensor chip current only. The board's regulator and pull-up resistors draw current in addition to these figures.

3.4 MAGNETIC CHARACTERISTICS (SENSOR CHIP, 25 °C)

PARAMETER	CONDITIONS	TYP	UNIT
Field range	Selectable full scale	**±30, 12, 8, 2**	G
Sensitivity	±30 G range	**1000**	LSB/G
Sensitivity	±12 G range	**2500**	LSB/G
Sensitivity	±8 G range	**3750**	LSB/G
Sensitivity	±2 G range	**15000**	LSB/G
ADC resolution	Per axis, two's complement	**16**	bit
Digital resolution	±30 G range	**1.0**	mG
Field resolution	Standard deviation, X and Y	**2**	mG
Field resolution	Standard deviation, Z	**3**	mG
Linearity	±30 G range, ±15 G applied	**0.5**	%FS
Hysteresis	3 sweeps across ±30 G	**0.03**	%FS
Offset		**±10**	mG
Sensitivity tempco	-40 to +85 °C	**±0.05**	%/°C
Axis orthogonality	Sensitivity directions	**90 ± 1**	°
Output data rate	Normal mode, selectable	**10, 50, 100, 200**	Hz
Output data rate	Continuous mode, maximum	**1500**	Hz
Heading accuracy	Chip rating, after calibration	**1 to 2**	°

Sensitivity is calibrated at zero field and falls slightly at high fields. The lowest range has the highest sensitivity; use ±2 G for compass work.

Heading accuracy is the sensor chip's own rating. In a finished build it depends on hard-iron calibration (section 8), keeping the board level, and distance from steel, magnets and current-carrying wires.

4 I2C INTERFACE

4.1 INTERFACE SUMMARY

PARAMETER	VALUE
Address	**0x2C, fixed (7-bit). Write byte 0x58, read byte 0x59**
Chip ID	**Register 0x00 reads 0x80**
Bus speed	**Standard mode 100 kHz, fast mode 400 kHz**
Pull-ups	**Fitted on the board**
Data registers	**0x01 to 0x06: X, Y, Z, each LSB then MSB**
Data format	**16-bit two's complement, saturates at -32768 and +32767**
Register read	**Write register address, repeated START, read; consecutive bytes follow**
Power-on reset	**Ready for I2C 250 µs max after chip VDD reaches operating voltage**
Restart by power	**Chip VDD below 0.2 V for at least 100 µs**
Data-ready signal	**Status register 0x09 bit 0 only; no pin**

Power-on and restart figures apply at the sensor chip's VDD, which follows VCC through the regulator.

4.2 I2C TIMING (SENSOR CHIP)

PARAMETER	SYMBOL	STD MIN	STD MAX	FAST MIN	FAST MAX	UNIT
SCL clock frequency	f_{SCL}	**0**	**100**	**0**	**400**	kHz
Hold time, (repeated) START	$t_{HD;STA}$	**4.0**		**0.6**		µs
SCL low period	t_{LOW}	**4.7**		**1.3**		µs
SCL high period	t_{HIGH}	**4.0**		**0.6**		µs
Set-up, repeated START	$t_{SU;STA}$	**4.7**		**0.6**		µs
Data hold time	$t_{HD;DAT}$	**0**		**0**		µs
Data set-up time	$t_{SU;DAT}$	**250**		**100**		ns
Rise time, SDA and SCL	t_r		**300**		**300**	ns
Fall time, SDA and SCL	t_f		**300**		**300**	ns
Set-up, STOP	$t_{SU;STO}$	**4.0**		**0.6**		µs
Bus free, STOP to START	t_{BUF}	**4.7**		**1.3**		µs
Bus capacitance, each line	C_b		**200**		**200**	pF
Data valid time	$t_{VD;DAT}$		**0.8**		**0.8**	µs
Data valid acknowledge	$t_{VD;ACK}$		**0.8**		**0.8**	µs

5 REGISTER SUMMARY

5.1 REGISTER MAP

ADDR	NAME	BITS	ACCESS
0x00	**CHIPID**	[7:0] chip ID, reads 0x80	R
0x01, 0x02	**XOUT**	X axis, LSB then MSB	R
0x03, 0x04	**YOUT**	Y axis, LSB then MSB	R
0x05, 0x06	**ZOUT**	Z axis, LSB then MSB	R
0x09	**STATUS**	[1] OVFL, [0] DRDY. Both clear when 0x09 is read	R
0x0A	**CONTROL 1**	[7:6] OSR2, [5:4] OSR1, [3:2] ODR, [1:0] MODE	R/W
0x0B	**CONTROL 2**	[7] SOFT_RST, [6] SELF_TEST, [3:2] RNG, [1:0] SET/RESET	R/W

DRDY sets when all three axes are loaded into 0x01 to 0x06. **OVFL** sets when any axis passes ±30000 LSB. Writing `0x80` to 0x0B is a soft reset that restores every register default. SELF_TEST runs only in continuous mode and clears itself after the next data update.

5.2 FIELD VALUES

FIELD	00	01	10	11
MODE	Suspend	Normal	Single	Continuous
ODR	10 Hz	50 Hz	100 Hz	200 Hz
OSR1	8	4	2	1
OSR2	1	2	4	8
RNG	±30 G	±12 G	±8 G	±2 G
SET/RESET	Set and reset on	Set only	Off	Off

OSR1 sets the digital filter bandwidth: a larger ratio gives less noise and more current. OSR2 adds a second filter stage. With set only or off, the offset is not renewed during measurement.

6 OPERATING MODES

MODE	MODE	BEHAVIOUR
Suspend	00	Default after power-up and soft reset. Registers can be read and written; no measurements.
Normal	01	Measures repeatedly at the ODR rate on the range set by RNG.
Single	10	Takes one measurement, then returns to suspend.
Continuous	11	Measures without sleeping, up to 1500 Hz. Needed for self-test.

Pass through suspend when changing between normal, single and continuous.

6.1 REGISTER-LEVEL START-UP

1. Read 0x00 and check for `0x80`.
2. Write `0x0C` to 0x0B: ±2 G range, set and reset on.
3. Write `0xC5` to 0x0A: normal mode, 50 Hz, OSR1 = 8, OSR2 = 8.
4. Poll 0x09 until bit 0 is 1, then read six bytes from 0x01.
5. Form each axis as a signed 16-bit value, MSB << 8 | LSB.
6. Divide by 15000 for gauss on the ±2 G range (2500, 3750 or 1000 on ±12, ±8 or ±30 G).

7 AXIS ORIENTATION AND MECHANICAL DATA

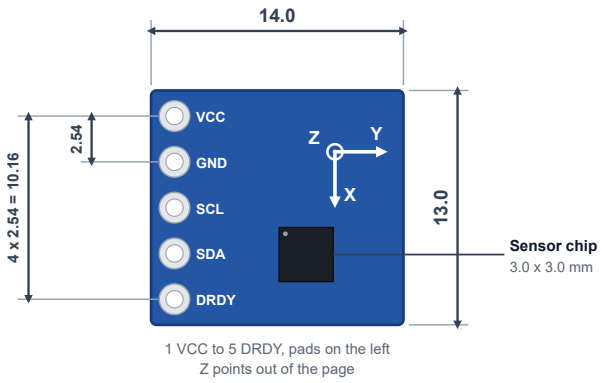


Figure 1. Front (component side). Simplified drawing, not to scale. Dimensions in mm.

Board size	**14.0 x 13.0 mm**
Connections	**5 pads, one row along the 13.0 mm edge**
Pad pitch	**2.54 mm**
Weight	**1.55 g with pin header**
Header	**5-pin male, 2.54 mm, supplied loose**
Sensor chip package	**LGA-16, 3.0 x 3.0 x 0.9 mm**

- **X** points along the pad row, towards the DRDY end.
- **Y** points across the board, away from the pads.
- **Z** points out of the component side.
- A field pointing along an arrow gives a positive reading on that axis.

8 HEADING CALCULATION AND CALIBRATION

1. **Mount it first.** Fit the board in its final position with everything else that will be near it, then calibrate. Moving it later changes the offsets.
2. **Hard-iron calibration.** Keep it level and turn it slowly through two or three full circles while recording the minimum and maximum of X and Y. The offset for each axis is (max + min) / 2. If the X and Y spans differ, scale one axis so both spans match.
3. **Heading.** With the board level and the X arrow pointing the way you face, heading = atan2(Y - Yoffset, X - Xoffset), converted to degrees and wrapped to 0 to 360.
4. **Check it against a phone compass.** If the heading runs backwards, negate Y. If it is a quarter turn out, swap X and Y to suit how the board is mounted.
5. **Add declination** to turn magnetic heading into true heading. Across New Zealand it is about 19 to 27 degrees east (world magnetic model 2025, October 2026). East is added.

LOCATION	DECLINATION
Kaitaia	**19.1° E**
Auckland	**20.3° E**
Wellington	**23.3° E**
Christchurch	**24.7° E**
Invercargill	**26.5° E**

World magnetic model 2025, October 2026. Declination changes slowly each year; look up your own location for best results.

9 APPLICATION AND IMPLEMENTATION

9.1 HOST CONNECTIONS

MODULE	UNO / NANO	MEGA 2560	ESP32	RASPBERRY PI
VCC	5V	5V	3V3	3V3 (pin 1)
GND	GND	GND	GND	GND (pin 6)
SCL	A5	21 (SCL)	GPIO22	GPIO3 (pin 5)
SDA	A4	20 (SDA)	GPIO21	GPIO2 (pin 3)
DRDY	Leave unconnected			

ESP32 pins are the ESP32 Dev Module defaults for `Wire.begin()`. On a Raspberry Pi, enable I2C; `i2cdetect -y 1` should show 2c. Python driver: `pip install adafruit-circuitpython-qmc5883p`.

9.2 PLACEMENT

- Keep steel screws, nuts, brackets, magnets, speakers and motors well away from the board. Use brass or nylon hardware nearby.
- Route battery, motor and USB cables away from the sensor, and twist supply pairs together.
- Keep the board level for compass use. Tilt shifts the heading.
- Recalibrate after moving the board or anything iron near it.

10 TROUBLESHOOTING

SYMPTOM	CAUSE AND FIX
Sketch prints "No QMC5883P at 0x2C"	Check VCC and GND, swap SCL and SDA, and check every header joint. An I2C scanner should report 0x2C.
Scanner shows 0x2C, but a compass sketch says no sensor found	The sketch uses a QMC5883L library (address 0x0D) or an HMC5883L library (0x1E). Install Adafruit QMC5883P Library instead.
Readings jump or the heading drifts	Iron, a magnet, a motor, a speaker or a current-carrying cable is nearby. Move them away and recalibrate in the final position.
Heading turns the wrong way or is a quarter turn out	The axes do not match how the board is mounted. Negate Y, or swap X and Y (section 8).
Heading is about 20 degrees out everywhere	Declination has not been added. In New Zealand add about 19 to 27 degrees east.
An axis sits at a large fixed value	The field is beyond the range (OVFL set). Move the magnet away or select a wider range.

11 EXAMPLE CODE (ARDUINO IDE)

11.1 FIRST TEST

```
// GY-271 QMC5883P first test (Click IT Electronics)
// Library: Adafruit QMC5883P (Library Manager)
// Wiring: VCC-5V or 3.3V, GND-GND, SCL-SCL,
// SDA-SDA. Leave DRDY unconnected.
#include <Adafruit_QMC5883P.h>

Adafruit_QMC5883P mag;

void setup() {
  Serial.begin(115200);
  Wire.begin();
  if (!mag.begin()) {   // address 0x2C
    Serial.println("No QMC5883P at 0x2C");
    while (1) delay(10);
  }
  mag.setMode(QMC5883P_MODE_NORMAL);
  mag.setODR(QMC5883P_ODR_50HZ);
  mag.setRange(QMC5883P_RANGE_2G);
  Serial.println("QMC5883P found");
}

void loop() {
  float x, y, z;
  if (mag.isDataReady() &&
      mag.getGaussField(&x, &y, &z)) {
    Serial.print("X "); Serial.print(x, 3);
    Serial.print("  Y "); Serial.print(y, 3);
    Serial.print("  Z "); Serial.println(z, 3);
  }
  delay(200);
}
```

1. Solder the header and wire the module as in 9.1.
2. In **Tools > Manage Libraries**, search **QMC5883P** and install **Adafruit QMC5883P Library**. Choose **Install all** so Adafruit BusIO is installed with it.
3. Upload the sketch and open the Serial Monitor at **115200** baud.
4. It prints **QMC5883P found**, then X, Y and Z in gauss. The values change smoothly as you turn the board.

11.2 CALIBRATED HEADING

```
// GY-271 QMC5883P heading (Click IT Electronics)
// For the first 20 s, turn the board slowly
// through full level circles to find offsets.
#include <Adafruit_QMC5883P.h>

Adafruit_QMC5883P mag;
const float DECL = 20.3;  // degrees east (Auckland)
float xMin = 9, xMax = -9, yMin = 9, yMax = -9;

void setup() {
  Serial.begin(115200);
  Wire.begin();
  if (!mag.begin()) {
    Serial.println("No QMC5883P at 0x2C");
    while (1) delay(10);
  }
  mag.setMode(QMC5883P_MODE_NORMAL);
  mag.setODR(QMC5883P_ODR_50HZ);
  mag.setRange(QMC5883P_RANGE_2G);
}

void loop() {
  float x, y, z;
  if (!mag.isDataReady() ||
      !mag.getGaussField(&x, &y, &z)) return;
  if (millis() < 20000) {   // calibrating
    xMin = min(xMin, x); xMax = max(xMax, x);
    yMin = min(yMin, y); yMax = max(yMax, y);
    return;
  }
  float xc = x - (xMax + xMin) / 2;
  float yc = y - (yMax + yMin) / 2;
  float h = atan2(yc, xc) * 180.0 / PI + DECL;
  if (h < 0) h += 360;
  if (h >= 360) h -= 360;
  Serial.print("Heading ");
  Serial.println(h, 0);
  delay(200);
}
```

Keep the board level with the X arrow pointing forward. For 20 seconds after reset it records the X and Y extremes, then prints the heading in degrees with declination added. Set `DECL` for your location (section 8).

Both sketches are written for Adafruit QMC5883P Library 1.0.2 with Arduino AVR core 1.8.6 (Uno, Nano) and ESP32 core 3.3.3 (ESP32 Dev Module). The library reads the chip ID before it reports the sensor as found.

12 REVISION HISTORY

REV	DATE	CHANGE
1	2026-10-07	Initial release.